CLAIMS

1. A substrate, suitable for the preparation of a composite membrane, which substrate comprises a porous matrix of fibres, characterised in that the fibres comprise mixed amorphous silica fibres that are bound with a binder.

2. A substrate according to claim 1, wherein the mixed amorphous silica fibres comprise micro-fine amorphous silica fibres.

3. A substrate according to claim 1 or claim 2, wherein the mixed amorphous silica fibres comprise one or more chopped strand(s) of amorphous silica.

4. A substrate according to any preceding claim wherein the amorphous silica fibres comprise a mixture of both microfibres and chopped fibres in the range of from 95:5% to 5:95% by weight of the mixture respectively.

5. A substrate according to claim 4 wherein the amorphous silica fibres comprise a mixture of both microfibres and chopped fibres in the range of from 70:30% to 30:70% by weight of the mixture respectively.

6. A substrate according to any preceding claim wherein the fibres have a diameter in the range of from 0.1μm to 50μm.

7. A substrate according to claim 6 wherein the fibres have a diameter in the range of from 0.4μm to 9μm.

8. A substrate according to any preceding claim, wherein the binder comprises a solution or dispersion of ion-exchange polymeric materials, or non-ion-conducting polymers, or inorganic materials or mixtures thereof.

9. A substrate according to any preceding claim for use in the preparation of a composite membrane.

10. A composite membrane comprising a porous substrate of fibres and at least one ion-conducting polymer, characterised in that the substrate is one according to any preceding claim, which comprises mixed amorphous silica fibres bound with a binder.

11. A composite membrane according to claim 10, which when tested by the method described herein in the Examples, results in less than or equal to about ±9% change in the area.

12. A composite membrane according to claim 10 or claim 11 wherein the total thickness of the membrane is less than 200μm.

13. A composite membrane according to any one of claims 10 to 12 for use in a fuel cell.

14. A process for the manufacture of a substrate according to any one of claims 1 to 9, which process comprises

(a) dispersing the fibres in water to form a slurry;

(b) depositing the slurry onto a mesh bed to form a network;

(c) drying and compacting the fibre network; and

(d) applying, before or after step (c), a dispersion of binder.

15. A process for the manufacture of a membrane according to any one of claims 10 to 13, which process comprises

(i) forming a porous substrate of, preferably randomly orientated individual mixed amorphous silica fibres bound with a binder by a process according to claim 14; and, thereafter,

(ii) impregnating the porous substrate with a polymeric material to produce a membrane.

16. A process according to claim 15, wherein step (ii) is carried out by nip roller coating of the substrate to fill it with a solution of ion-conducting polymeric material, and further compaction and drying of the membrane.

17. A membrane electrode assembly comprising a substrate according to any one of claim 1 to 9 and/or a composite membrane according to any one of claims 10 to 13.

18. A fuel cell comprising a substrate according to any one of claim 1 to 9 and/or a composite membrane according to any one of claims 10 to 13.